Background Statistics for Data Sets with Non-Detects

User Selected Options		
Date/Time of Computation	9/22/2014 12:36:35 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	95%	
Coverage	95%	
rent or Future K Observations	1	
mber of Bootstrap Operations	2000	

Aroclors

General Statistics

Total Number of Observations	44	Number of Missing Observations	0	
Number of Distinct Observations	37			
Number of Detects	19	Number of Non-Detects	25	
Number of Distinct Detects	18	Number of Distinct Non-Detects	19	
Minimum Detect	4.95	Minimum Non-Detect	1.3	
Maximum Detect	20.45	Maximum Non-Detect	5.2	
Variance Detected	17.2	Percent Non-Detects	56.82%	
Mean Detected	9.097	SD Detected	4.147	
Mean of Detected Logged Data	2.127	SD of Detected Logged Data	0.395	

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.091	d2max (for USL)	2.906

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.827	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.901	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.253	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.203	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	4.67	SD	4.684
95% UTL95% Coverage	14.46	95% KM UPL (t)	12.63
90% KM Percentile (z)	10.67	95% KM Percentile (z)	12.37
99% KM Percentile (z)	15.57	95% KM USL	18.28

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	4.552	SD	4.834
95% UTL95% Coverage	14.66	95% UPL (t)	12.77
90% Percentile (z)	10.75	95% Percentile (z)	12.5
99% Percentile (z)	15.8	95% USL	18.6
DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons			

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.805	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.742	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.212	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.199	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only

k hat (MLE)	6.357	k star (bias corrected MLE)	5.388
Theta hat (MLE)	1.431	Theta star (bias corrected MLE)	1.688
nu hat (MLE)	241.6	nu star (bias corrected)	204.7
MLE Mean (bias corrected)	9.097		
MLE Sd (bias corrected)	3.919	95% Percentile of Chisquare (2k)	19.37

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

	A	B	C	D	E	F	G	H	I	J	K	L
63	GROS may not be used when kstar of detected data is small such as < 0.1											
64	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
65	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
66					Minimum	0.01				Mean		4.051
67					Maximum	20.45				Median		0.706
68					SD	5.212				CV		1.287
69				k hat (MLE)		0.264			k star (bias corrected MLE)			0.261
70				Theta hat (MLE)		15.36			Theta star (bias corrected MLE)			15.52
71				nu hat (MLE)		23.21			nu star (bias corrected)			22.96
72			MLE Mean (bias corrected)			4.051			MLE Sd (bias corrected)			7.93
73		95% Percentile of Chisquare (2k)				2.494				90% Percentile		12.12
74				95% Percentile		19.36				99% Percentile		38.51
75	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
76	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
77					WH	HW					WH	HW
78	Approx. Gamma UTL with 95% Coverage				26.32	33.79		95% Approx. Gamma UPL			18.01	21.14
79			95% Gamma USL		51.14	77.55						
80												
81	The following statistics are computed using gamma distribution and KM estimates											
82	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
83			k hat (KM)			0.994				nu hat (KM)		87.48
84					WH	HW					WH	HW
85	Approx. Gamma UTL with 95% Coverage				16.93	17.68		95% Approx. Gamma UPL			13.3	13.56
86			95% Gamma USL		26.51	29.25						
87												
88	Lognormal GOF Test on Detected Observations Only											
89		Shapiro Wilk Test Statistic				0.92		Shapiro Wilk GOF Test				
90		5% Shapiro Wilk Critical Value				0.901		Detected Data appear Lognormal at 5% Significance Level				
91			Lilliefors Test Statistic			0.186		Lilliefors GOF Test				
92			5% Lilliefors Critical Value			0.203		Detected Data appear Lognormal at 5% Significance Level				
93	Detected Data appear Lognormal at 5% Significance Level											
94												
95	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
96			Mean in Original Scale			5.492			Mean in Log Scale			1.486
97			SD in Original Scale			4.174			SD in Log Scale			0.634
98			95% UTL95% Coverage			16.64		95% BCA UTL95% Coverage				19.41
99		95% Bootstrap (%) UTL95% Coverage				19.81			95% UPL (t)			12.99
100			90% Percentile (z)			9.959			95% Percentile (z)			12.54
101			99% Percentile (z)			19.31			95% USL			27.9
102												
103	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
104			KM Mean of Logged Data			1.069		95% KM UTL (Lognormal)95% Coverage				21.56
105			KM SD of Logged Data			0.957			95% KM UPL (Lognormal)			14.83
106		95% KM Percentile Lognormal (z)				14.07			95% KM USL (Lognormal)			47.06
107												
108	Background DL/2 Statistics Assuming Lognormal Distribution											
109			Mean in Original Scale			4.552			Mean in Log Scale			0.937
110			SD in Original Scale			4.834			SD in Log Scale			1.111
111			95% UTL95% Coverage			26.03			95% UPL (t)			16.86
112			90% Percentile (z)			10.59			95% Percentile (z)			15.86
113			99% Percentile (z)			33.81			95% USL			64.37
114	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
115												
116	Nonparametric Distribution Free Background Statistics											
117	Data appear to follow a Discernible Distribution at 5% Significance Level											
118												
119	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
120			Order of Statistic, r			44		95% UTL with95% Coverage				20.45
121			Approximate f			2.316		Confidence Coefficient (CC) achieved by UTL				0.895
122			95% UPL			15.56			95% USL			20.45
123		95% KM Chebyshev UPL				25.32						
124												

	A	B	C	D	E	F	G	H	I	J	K	L
125	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
126	data set free of outliers and consists of observations collected from clean unimpacted locations.											
127	The use of USL tends to provide a balance between false positives and false negatives provided the data											
128	represents a background data set and when many onsite observations need to be compared with the BTV.											
129												